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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/874,606	06/05/2001	Stephen L. Skala	PHA 51243A	6706

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EXAMINER

IM, JUNGHWA M

ART UNIT PAPER NUMBER

2811

DATE MAILED: 08/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/874,606

Applicant(s)

SKALA ET AL.

CN

Examiner

Junghwa M. Im

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

The finality of the Office Action of December 4, 2003 is withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 14 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 14 recites an Al bond pad is insulated by means for electrically insulating the pad, then barrier means insulated by the passivation material. This indicates that two separate passivation/insulating layers for the bond pad and the barrier layer. However, the specification especially, Figures of the Application disclose one passivation layer shared by two layers.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 14 recites the limitation "the passivation material." There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Rates (US 5,677,203).

Regarding claims 1 and 6, Fig. 1 of Rates shows a semiconductor chip comprising a metal bond pad layer(12, Al; col.5, line 28) over a die substrate and insulated on at least two sides by passivation material (24, 25), a diffusion barrier layer(20, 22) over the metal bond pad, at least two entire sides by passivation material (24, 25), and a metal layer over (18) the die, the metal bond pad, the diffusion barrier layer and at least partially over, and in contact with, a portion of passivation material not over the diffusion barrier layer, the metal layer being configured and arranged for connecting to a wire bond, wherein the diffusion barrier layer is constructed to mitigate inter-metallic compound reaction (col.5, lines 26-36).

Regarding claim 5, Rates shows a use for flip chip bonding (col. 2, lines 19-21).

Claim 15 is rejected under 35 U.S.C. 102(b) as being anticipated by Weiler (US 5,559,056).

Regarding claim 15, Fig. 2 of Weiler shows a semiconductor chip comprising a metal bond pad layer(26) over the substrate(22), a diffusion barrier layer(28) over the metal bond pad, and a metal layer over (30) the diffusion barrier layer, and the metal layer being configured and

Art Unit: 2811

arranged for connecting to a wire bond, and the metal bond pad, the diffusion barrier layer and the metal layer all being insulated on at two sides by passivation material(24; col.2, lines 28-31), wherein the diffusion barrier layer is constructed to mitigate inter-metallic compound reaction (col.4, lines 49-53), and the passivation material is arranged to be at least partially over the metal bond pad and the diffusion barrier.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4, 7-9 and 11-14 are rejected under 35 U.S.C. 103 as being unpatentable over Rates in view of Greer (U.S. Pat. No. 6,451,681).

Regarding claim 2, Rates shows substantially the entire claimed structure except a TiN barrier layer. Greer teaches that the diffusion barrier layer includes TiN (col. 3, line 55). It would have been obvious to one of ordinary skill in the art at the time of the invention to have TiN barrier layer in the device of Rates with the teaching of Greer in order to improve the adhesion between the metal layers.

Regarding claims 3 and 4, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the diffusion barrier layer recited in pending claim, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Art Unit: 2811

In addition, Greer teaches a diffusion barrier layer (200 and 204) has a thickness that at least 1 micron (col. 3, line 50 – col. 4, line 9).

Regarding claim 7, Greer teaches TiN barrier layers as established with respect to claim 2.

Regarding claim 8, Rates shows that the diffusion barrier layer is constructed and arranged to mitigate inter-metallic Al/Au compounds forming as a reaction to the metal layer Al/Au connecting to the wire bond (col. 5, line 27-37).

Regarding claim 9, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the metal layer recited in pending claim, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

And, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the diffusion barrier layer recited in pending claim, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In addition, Greer teaches a diffusion barrier layer (200 and 204) has a thickness that at least 1 micron (col. 3, line 50 – col. 4, line 9).

Regarding claim 11, Rates shows substantially the entire claimed structure except a TiN barrier layer. Greer teaches that the diffusion barrier layer includes TiN (col. 3, line 55). It would have been obvious to one of ordinary skill in the art at the time of the invention to have TiN barrier layer in the device of Rates with the teaching of Greer in order to improve the adhesion between the metal layers.

Art Unit: 2811

Regarding claim 12, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the metal layer recited in pending claim, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

And, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the diffusion barrier layer recited in pending claim, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In addition, Greer teaches a diffusion barrier layer (200 and 204) has a thickness that at least 1 micron (col. 3, line 50 – col. 4, line 9).

Regarding claim 13, Rates shows that the diffusion barrier layer is constructed and arranged to mitigate inter-metallic Al/Au compounds forming as a reaction to the metal layer Al/Au connecting to the wire bond (col. 5, line 27-37).

Regarding claim 14, insofar understood, Rates shows substantially the entire claimed structure except a TiN barrier layer. Greer teaches that the diffusion barrier layer includes TiN (col. 3, line 55). It would have been obvious to one of ordinary skill in the art at the time of the invention to have TiN barrier layer in the device of Rates with the teaching of Greer in order to improve the adhesion between the metal layers.

Claims 16-20 are rejected under 35 U.S.C. 103 as being unpatentable over Weiler in view of Greer.

Regarding claim 16, Weiler shows substantially the entire claimed structure except a TiN barrier layer. Greer teaches that the diffusion barrier layer includes TiN (col. 3, line 55). It

Art Unit: 2811

would have been obvious to one of ordinary skill in the art at the time of the invention to have TiN barrier layer in the device of Weiler with the teaching of Greer in order to improve the adhesion between the metal layers.

Regarding claim 17, Weiler shows that the diffusion barrier layer is constructed and arranged to mitigate inter-metallic Al/Au compounds forming as a reaction to the metal layer Al/Au connecting to the wire bond (col.4, lines 49-53).

Regarding claim 18, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the diffusion barrier layer recited in pending claim, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In addition, Greer teaches a diffusion barrier layer (200 and 204) has a thickness that at least 1 micron (col. 3, line 50 – col. 4, line 9).

Regarding claim 19, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the metal layer recited in pending claim, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 20, Greer shows a flip chip application (col. 5, lines 3-4).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rates in view of Camilletti et al. (US 5,693,565), hereafter Camilletti.

Regarding claim 10, Rates shows substantially the entire claimed structure except the limitation for two metal layers. Camilletti shows that the metal bond pad and metal layer include the same type of metal (col. 8, line 8-14). It would have been obvious to have the same metal

Art Unit: 2811

layers in the device of Rates with the teaching of since the homogeneous material between the two layers provide better adhesion thus, improving the performance of the device.

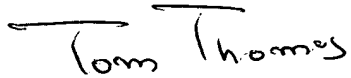
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (703) 305-3998. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

jmi
August 11, 2003


TOM THOMAS
SUPERVISORY PATENT EXAMINER
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